NRCS
Natural Resources Conservation Service

Utah Water Supply Outlook Report

April, 2010

Spirit Lake Lodge – April 2010

Spirit Lake Lodge - April 2005, Photos Mike Bricco.

Water Supply Outlook Reports
and Federal - State - Private Cooperative Snow Surveys

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How forecasts are made

Most of the annual streamflow in the western United States originates as snowfall that has accumulated in the mountains during the winter and early spring. As the snowpack accumulates, hydrologists estimate the runoff that will occur when it melts. Measurements of snow water equivalent at selected manual snowcourses and automated SNOTEL sites, along with precipitation, antecedent streamflow, and indices of the El Niño / Southern Oscillation are used in computerized statistical and simulation models to prepare runoff forecasts. These forecasts are coordinated between hydrologists in the Natural Resources Conservation Service and the National Weather Service. Unless otherwise specified, all forecasts are for flows that would occur naturally without any upstream influences.

Forecasts of any kind, of course, are not perfect. Streamflow forecast uncertainty arises from three primary sources: (1) uncertain knowledge of future weather conditions, (2) uncertainty in the forecasting procedure, and (3) errors in the data. The forecast, therefore, must be interpreted not as a single value but rather as a range of values with specific probabilities of occurrence. The middle of the range is expressed by the 50% exceedance probability forecast, for which there is a 50% chance that the actual flow will be above, and a 50% chance that the actual flow will be below, this value. To describe the expected range around this 50% value, four other forecasts are provided, two smaller values (90% and 70% exceedance probability) and two larger values (30%, and 10% exceedance probability). For example, there is a 90% chance that the actual flow will be more than the 90% exceedance probability forecast. The others can be interpreted similarly.

The wider the spread among these values, the more uncertain the forecast. As the season progresses, forecasts become more accurate, primarily because a greater portion of the future weather conditions become known; this is reflected by a narrowing of the range around the 50% exceedance probability forecast. Users should take this uncertainty into consideration when making operational decisions by selecting forecasts corresponding to the level of risk they are willing to assume about the amount of water to be expected. If users anticipate receiving a lesser supply of water, or if they wish to increase their chances of having an adequate supply of water for their operations, they may want to base their decisions on the 90% or 70% exceedance probability forecasts, or something in between. On the other hand, if users are concerned about receiving too much water (for example, threat of flooding), they may want to base their decisions on the 30% or 10% exceedance probability forecasts, or something in between. Regardless of the forecast value users choose for operations, they should be prepared to deal with either more or less water. (Users should remember that even if the 90% exceedance probability forecast is used, there is still a 10% chance of receiving less than this amount.) By using the exceedance probability information, users can easily determine the chances of receiving more or less water.

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STATE OF UTAH GENERAL OUTLOOK
April 1, 2010

SUMMARY

April 1 is the typical peak for snowpack accumulation. At this point, lower elevation and latitude snowpacks normally start to melt while higher elevations continue to accumulate for a few more weeks. Streamflows gradually begin to increase toward peak flows which normally occur from mid May to early June. The whole focus of water supply forecasting has been looking to what snowpack we would have on April 1 and with each passing month, the probability of a small snowpack in northern Utah has turned to reality whereas in southern Utah, it was not a question of getting average but how much above that mark would ultimately be realized. The numbers are in: Bear – 58%, Weber – 64%, Provo – 67%, Uintah Basin – 76%, SE Utah – 92%, Sevier – 111% and SW Utah – 148% of average. Some areas like SE Utah and the Sevier River are split with much higher snowpacks on the Upper Sevier and in the Moab/Monticello area versus the lower Sevier and the Wasatch Plateau which have much lower values. March precipitation was below average in the north (70%) and near average in the south (110%) which brings the year to date precipitation to below normal in the north (70%) and near average in the south (105%). Current soil moisture saturation levels in runoff producing areas are: Bear – 56%, Weber – 55%, Provo – 40%, Uintah Basin – 21%, SE Utah – 44%, Sevier – 46% and SW Utah – 46%, up 5% to 16 % from last month. Dryer soils typically mean less runoff from snowmelt. Reservoir storage is currently at 71% of capacity statewide compared to 66% last year. General water supply conditions are much below to below average in northern Utah, above average on the Virgin and near to below average in central Utah. Streamflow forecasts range from 17% for the Bear River at Stewart Dam to 152% of average on the Sevier River nr Kingston. Surface Water Supply Indices range from 21% on the Bear River to 80% for the Virgin. The extremely low value for the Bear River is a reflection of Bear Lake storage which continues to be well below normal.

SNOWPACK

April first snowpacks as measured by the NRCS SNOTEL system are as follows: Bear – 58%, Weber – 64%, Provo – 71%, Uintah Basin – 76%, SE Utah – 92%, Sevier – 111% and SW Utah – 148% of average and the statewide figure is 80% of average. Under a cool and wet April/May climate scenario, snowpacks could continue to increase. Warmer, dryer conditions will begin melt quickly. Cool and wet would benefit northern Utah, warm and dry would benefit southern Utah.

PRECIPITATION

Mountain precipitation during March was: Bear – 56%, Weber – 58%, Provo – 77%, Uintahs – 88%, SE Utah – 102%, Sevier – 110%, SW Utah – 112% and the statewide figure is 82% of average. This brings the seasonal accumulation (Oct-Mar) to 80% of average statewide.

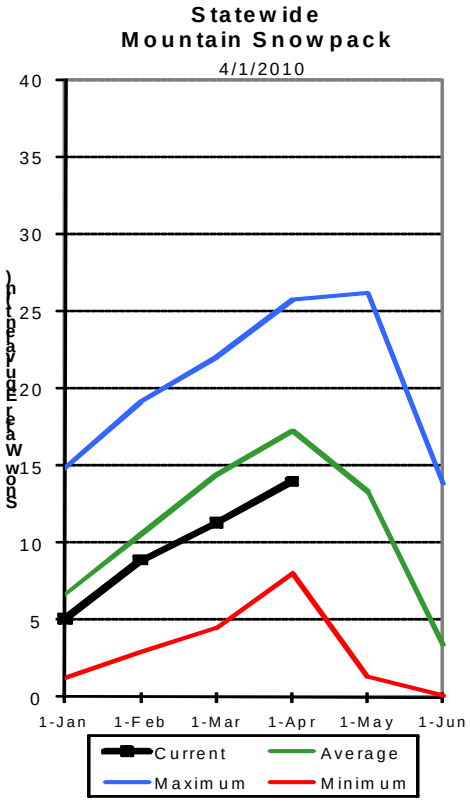
RESERVOIRS

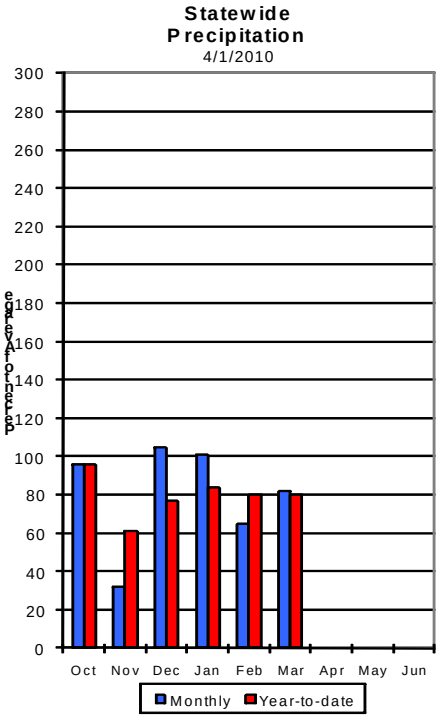
Storage in 41 of Utah's key irrigation reservoirs is at 71% of capacity up 5% compared to March of last year year. Reservoir carryover benefited from the unusual wet conditions of last spring which delayed substantial water use by nearly 6 weeks. Some reservoirs in northern Utah may not fill given current water supply projections.

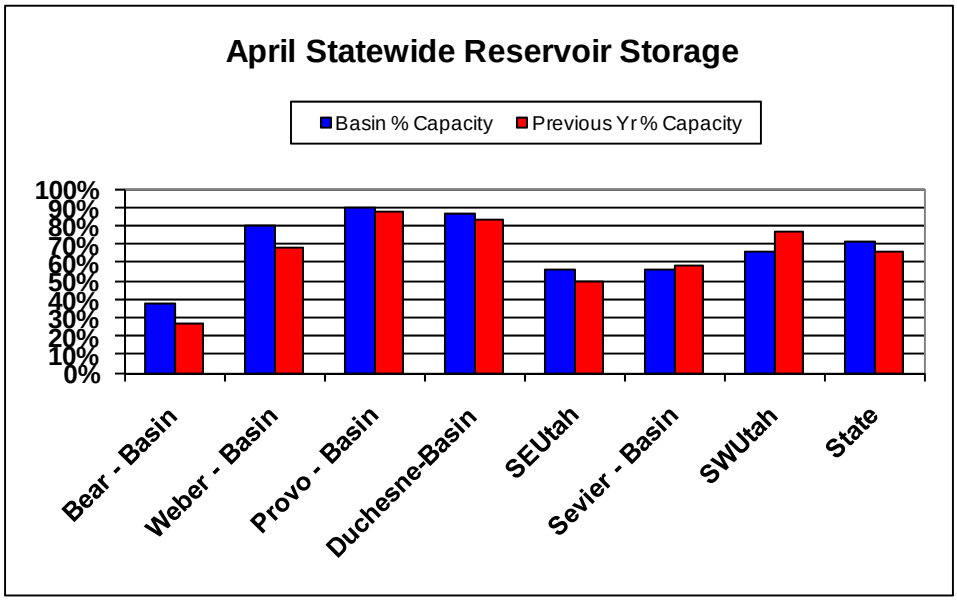
STREAMFLOW

Snowmelt streamflows are expected to have a wide range from much below average to above average across the state of Utah this year. Forecast streamflows range from 17% on the Bear

River at Stewart Dam to 152% on the Sevier River nr Kingston. Most flows are forecast to be in the 40% to 80% range.

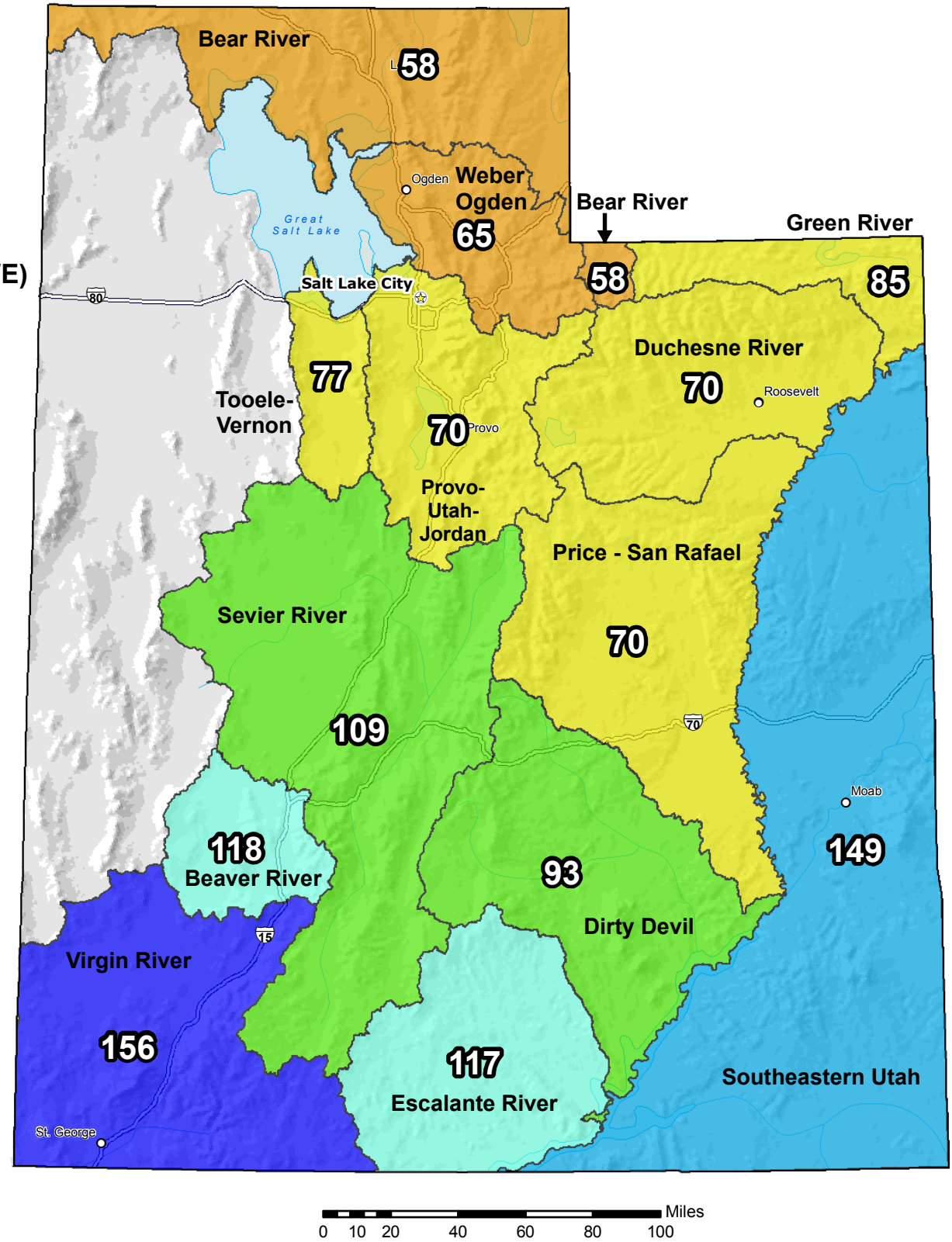






Utah
SNOTEL Current Snow Water Equivalent (SWE)
% of Normal

Apr 01, 2010



Snow Water Equivalent (SWE) Basin-wide Percent of 1971-2000 Normal

- unavailable *
- <50%
- 50 - 69%
- 70 - 89%
- 90 - 109%
- 110 - 129%
- 130 - 149%
- >=150%

* *Data unavailable at time of posting or measurement is not representative at this time of year*

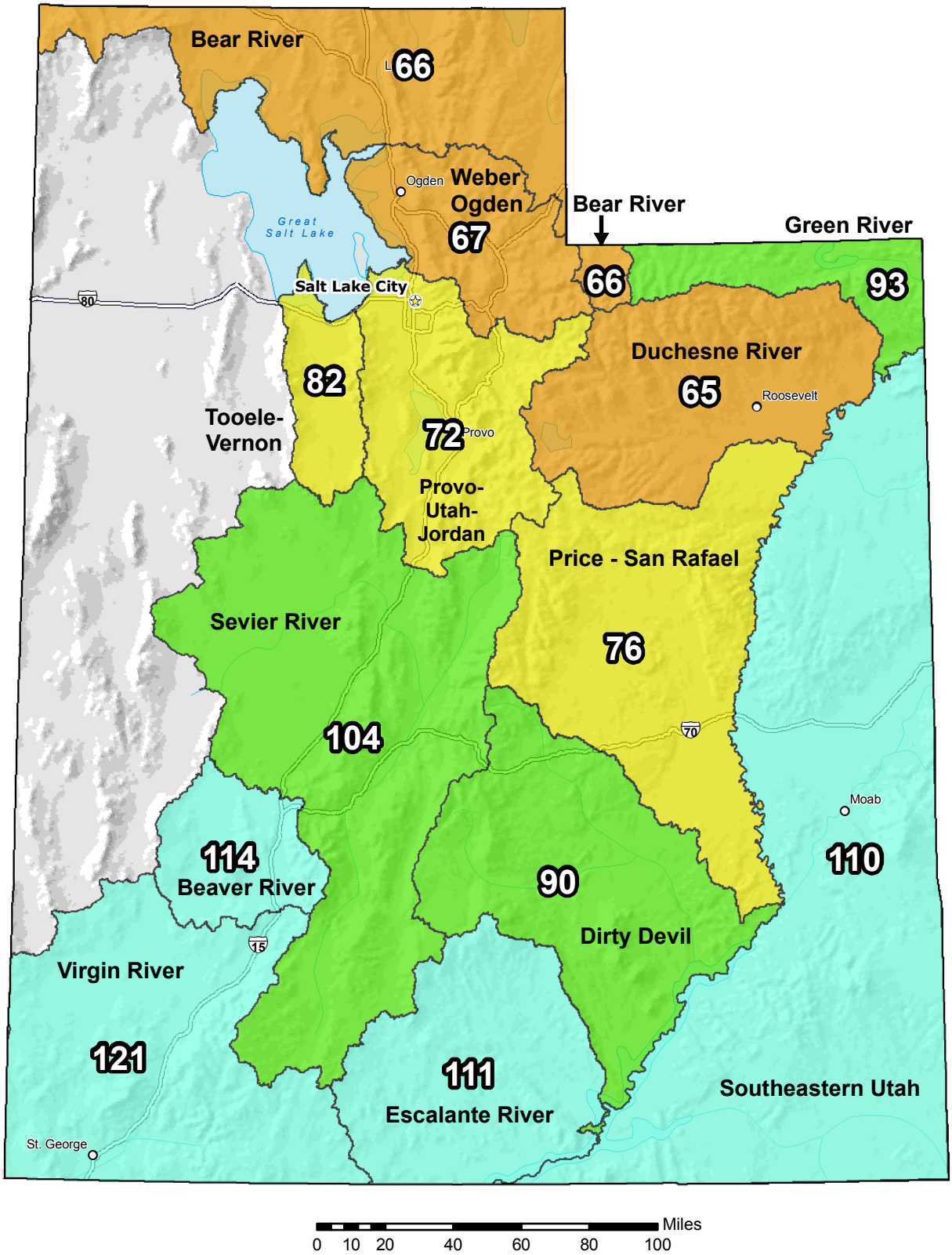
Provisional Data Subject to Revision

The snow water equivalent percent of normal represents the current snow water equivalent found at selected SNOTEL sites in or near the basin compared to the average value for those sites on this day. Data based on the first reading of the day (typically 00:00).

Prepared by the USDA/NRCS National Water and Climate Center
Portland, Oregon http://www.wcc.nrcs.usda.gov/gis/
Based on data from http://www.wcc.nrcs.usda.gov/reports/
Science contact: Tom.Pagano@por.usda.gov 503 414 3010

Utah
SNOTEL Water Year (Oct 1) to Date Precipitation
% of Normal

Apr 01, 2010



Water Year (Oct 1) to Date Precipitation Basin-wide Percent of 1971-2000 Normal

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- 130 - 149%
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Provisional Data Subject to Revision

The water year to date precipitation percent of normal represents the accumulated precipitation found at selected SNOTEL sites in or near the basin compared to the average value for those sites on this day. Data based on the first reading of the day (typically 00:00).

Prepared by the USDA/NRCS National Water and Climate Center
Portland, Oregon http://www.wcc.nrcs.usda.gov/gis/
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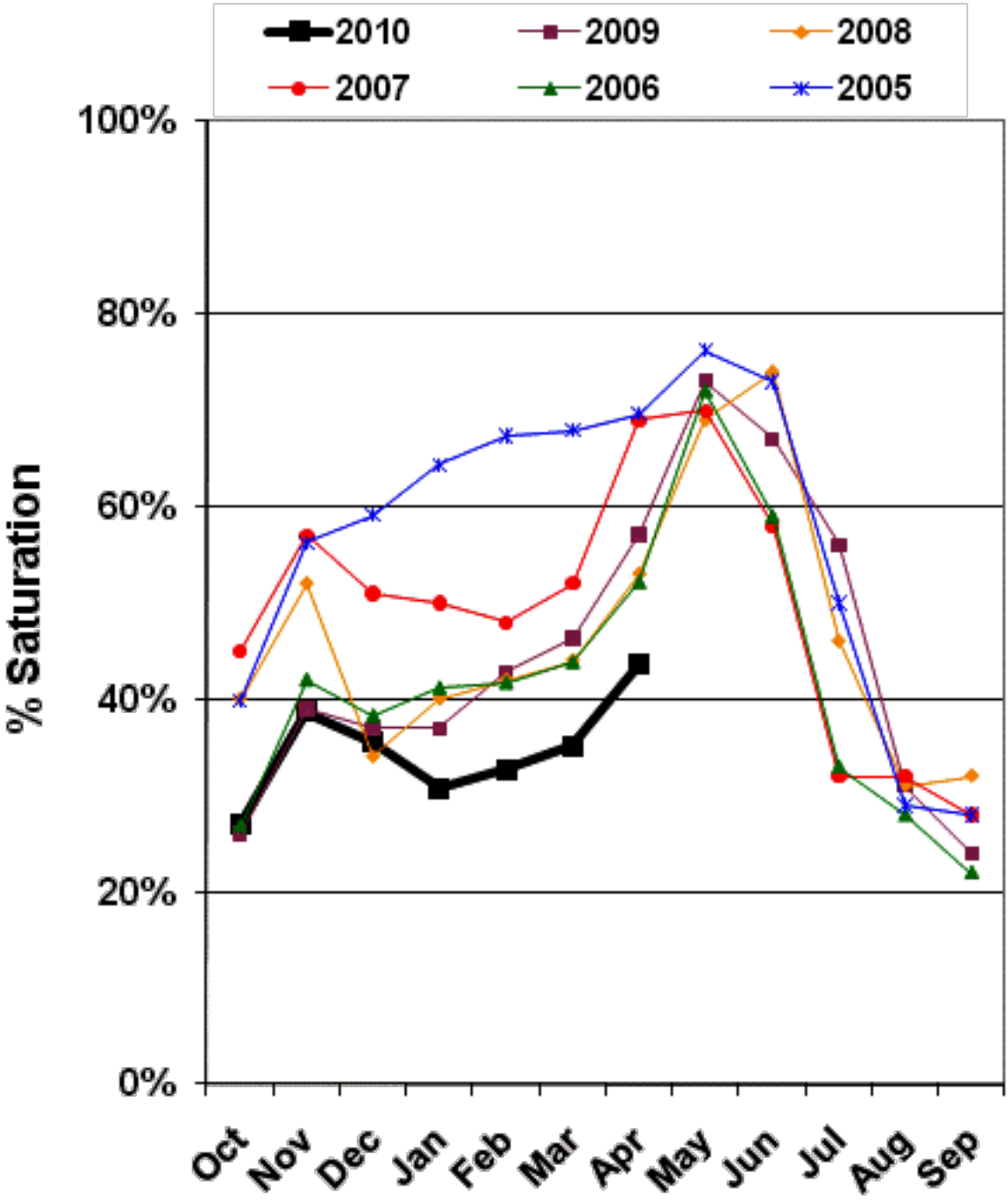
Statewide Soil Moisture



Surface Water Supply Index

March 1, 2010 Basin or Region	SWSI	Percentile	Years with Similar SWSI
Bear River	-2.38	21%	33,37,02,09
Ogden River	-2.21	24%	90,01,04,07
Weber River	-1.19	36%	79,87,94,08
Provo	-1.04	38%	90,81,00,91
West Uintah Basin	-2.13	24%	07,04,76,90
East Uintah Basin	-1.30	34%	91,88,92,80
Price River	-2.24	23%	02,89,01,94
Joe's Valley	-1.27	35%	89,94,07,04
Ferron Creek	-2.03	26%	88,94,00,04
Moab	1.39	67%	91,94,97,92
Upper Sevier River	-0.56	43%	79,58,59,02
Lower Sevier River	-0.32	46%	01,68,09,71
Beaver River	1.00	62%	06,75,87,70
Virgin River	2.50	80%	06,88,98,95

SWSI Scale: -4 to 4	Percentile: 0 - 100%

What is a Surface Water Supply Index?

The Surface Water Supply Index (SWSI) is a predictive indicator of total surface water availability within a watershed for the spring and summer water use seasons. The index is calculated by combining pre-runoff reservoir storage (carryover) with forecasts of spring and summer streamflow which are based on current snowpack and other hydrologic variables. SWSI values are scaled from +4.1 (abundant supply) to -4.1 (extremely dry) with a value of zero (0) indicating median water supply as compared to historical analysis. SWSI's are calculated in this fashion to be consistent with other hydroclimatic indicators such as the Palmer Drought Index and the Precipitation index.

Utah Snow Surveys has also chosen to display the SWSI as a PERCENT CHANCE OF NON-EXCEEDANCE. While this is a cumbersome name, it has the simplest application. It can be best thought of as a scale of 1 to 99 with 1 being the drought of record (driest possible conditions) and 99 being the flood of record (wettest possible conditions) and a value of 50 representing average conditions. This rating scale is a percentile rating as well, for example a SWSI of 75% means that this years water supply is greater than 75% of all historical events and that only 25% of the time has it been exceeded. Conversely a SWSI of 10% means that 90% of historical events have been greater than this one and that only 10% have had less total water supply. This scale is far more intuitive for most people and is totally comparable between basins: a SWSI of 50% means the same relative ranking on watershed A as it does on watershed B, which may not be strictly true of the +4 to -4 scale.

For more information on the SWSI go to: www.ut.nrcs.usda.gov/snow/ on the water supply page. The entire period of historical record for reservoir storage and streamflow is available.